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AUTHOR Christie, Samuel G.; Saccone, Peter P.
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ABSTRACT

This paper reports the results of a pilot program, "Fitness, Academics, and Self-Esteem Training" (FAST), conducted during the 1984/85 school year at Meridian School to test the hypotheses that a program of aerobic exercise with the focus on running, conducted by the classroom teacher, would result in a higher rate of academic achievement, better cardiovascular fitness and respiratory efficiency, and higher self-esteem as measured by academic aspiration. Both the project group and a comparison group of fourth and fifth graders from another Cajon Valley school were measured at the beginning and end of the year on the rate of academic achievement, cardiovascular fitness, and academic aspiration. The comparison group participated in the normal physical education activities for fourth and fifth graders, but not in the aerobic exercise-running program. At the end of the year participants in the FAST program were found to be achievinng at a higher rate in reading, language, and math, and to have better cardiovascular fitness and respiratory efficiency than non-participants. There were no differences in the scores on academic aspiration between participants and non-participants. (Author)

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AN EVALUATION OF THE FITNESS, ACADEMICS, AND SELF-ESTEEM TRAINING PROGRAM AT MERIDIAN SCHOOL 1984-1985

Prepared by

Samuel G. Christie, Ed.D.
Coordinator, Program Evaluation

Peter P. Saccone, M.S.

Cajon Valley School District
El Cajon, California

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ABSTRACT

This paper reports the results of a pilot program (FAST) conducted during the 1984/85 school year at Meridian School to test the hypotheses that a program of aerobic exercise with the focus on running, conducted by the classroom teacher, would result in a higher rate of academic achievement, better cardiovascular fitness and respiratory efficiency, and higher self esteem as measured by academic aspiration. Both the project group and a comparison group of fourth and fifth graders from another Cajon Valley school were measured at the beginning and end of the year on rate of academic achievement, cardiovascular fitness, and academic aspiration.

The comparison group participated in the normal physical education activities for fourth and fifth graders, but not in the aerobic exercise-running program.

At the end of the year participants in the FAST program were found to be achieving at a higher rate in reading, language, and math, and to have better cardiovascular fitness and respiratory efficiency than non-participants.

There were no differences in the scores on academic aspiration between participants and non-participants.

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INTRODUCTION

This paper reports on the results of a pilot program at Meridian School, a program entitled Fitness, Academics, and Self-esteem Training (FAST). The program is an outgrowth of an earlier physical education program, "It's Funner to be a Runner," developed by a 5th grade teacher at the school, Peter Saccone.

The purpose of this pilot program was to collect empirical evidence on the effects of this kind of physical education program on the students participating. The program was conceived as a potential magnet program at Meridian which would include students in kindergarten through fifth grades.

The aspect of this program that distinguishes it from others is the organized physical activities of the participants, primarily aerobic exercise with the focus on running conducted by the classroom teacher. The academic aspect of the program was no different from the normal activities carried out by teachers in both the project and the comparison school.

The Objectives of the Program

There were three objectives in this pilot program. The first objective was to have students increase their rate of academic achievement beyond what is normally expected.

The second objective related to the physical aspects of the program. The objective here was to improve students' physical fitness.

The third objective was to have students feel more positive about themselves as manifested in higher aspirations regarding school work.

The Design of the Evaluation Study

The participants in this study were students at Meridian school enrolled in one fourth and one fifth grade class. A group of fourth and fifth grade students from another school in the district was chosen to serve as a comparison/control group. Students in the comparison school were enrolled in one fourth grade class, one fifth grade class, and one four/five combination.

Both at the beginning and at the end of the study, students in both the participant group and the control group were compared on variables that related to the objectives of the program. Hypotheses were formulated on the assumption that differences would not exist between these two groups of students at the beginning of the study. These hypotheses were:

Hypothesis I

At the end of the 1984/85 school year participants in the FAST program will exhibit higher rates of achievement in reading, language, and math than non-participants.

Hypothesis II

At the end of the 1984/85 school year students participating in the FAST program will demonatrate better cardiovascular fitness than non-participants.

Hypothesis III

At the end of the 1984/85 school year students participating in the FAST program will have more positive self esteem as measured by academic aspirations, than non-participants.

Results of the Study

Academic Achievement

The first objective of the FAST program was to have students achieve academically at a rate beyond normal expectations. The measure of academic achievement was the NCE score on Total Battery on the Comprehensive Test of Basic Skills (CTBS). The Total Battery is the combination of Total Reading, Total Language, and Total Math. The NCE score is a standard, or a scale score with an average of 50 and a range from 1-99. The score of 50 NCE is the score obtained by the average student in the nation when the CTBS was developed.

Students in both groups took the CTBS test at the end of 1984 and again in 1985. Normal growth for students is a score of 50 NCE each successive year if the school population matches that of the nation. The expectation for students in Cajon Valley as a whole is 53 NCE since El Cajon parents are slightly higher in socioeconomic status than were parents of students who took the CTBS when it was developed. Since school populations vary within the school district, expectations for students in Cajon Valley also vary. The expectations for the students at Meridian was 52 NCE, and for the students in the comparison school, 48. The NCE scores for the two groups in 1984 and 1985 were:

	Fourth Grade		Fifth Grade	
	1984	1985	1984	1985
Meridian	41	57	56	68
Comparison	47	48	41	44

These data show that both groups had an increase in scores in 1985 compared to 1984. Note also that the differences in 1984 were not the same for the two grades. In 1984 the fourth grade in the comparison group scored six points higher than the participant group. In fifth grade in 1984 the participant group scored fifteen points higher than the comparison group. The first step in the analysis is to determine if the scores of the two groups were significantly different in 1984 before the program began.

Grade four analysis. This analysis showed that there was a significant difference for the fifth grade but the five points difference in the fourth grade was not. The data for fourth grade are shown below in Table I.

Table I

A Comparison of Pre Test NCE Score on CTBS Total Battery for 1984, Fourth Grade Participants and Non-Participants in the FAST Program

	(N)	NCE Average	Standard Deviation	Pooled Variances	
Participants	(21)	41	15.02	t-test =	-1.32
Non-Participants	(22)	47	16.10	Degrees of freedom =	41
				Level of Significance =	.19

The convention for statistical significance is .05. This means that the observed difference would occur by chance alone no more than five times out of 100. With the level of significance at .19 attained, as shown in Table I, the difference of six NCE between the participants and non-participants would occur 19 times out of 100 just by chance.

We concluded, therefore, that the two groups were alike in terms of achievement before the program began. Therefore, we proceeded with the independent groups t-test comparing the two scores of the two groups on the 1985 test scores. This is shown in Table II below.

Table II

A Comparison of Post Test NCE Scores on CTBS Total Battery for 1985 Fourth Grade Participants and Non-Participants in the FAST Program

	(N)	NCE Average	Standard Deviation	Pooled Variances	
Participants	(21)	57.1	12.63	t-test =	1.99
Non-Participants	(22)	47.5	18.36	Degrees of Freedom =	41
				Level of Significance =	.05

The data in Table II shows that the difference of 9.6 NCE is significant at the .05 level of confidence which supports hypothesis I, i.e. that participants in FAST will achieve at a higher rate academically than non-participants.

Grade five analysis. Since the 1984 fifth grade scores of the participants were significantly greater than the non-participants, the t-test for independent groups could not be utilized. In this case it would not be meaningful to ask the question - Is there a significant difference in the test scores of participants and non-participants at the end of 1985? Therefore, a paired difference t-test was utilized for fifth grade. This analysis is made by comparing the 1984 and 1985 scores of participants to determine the significance of the gain, and doing the same for the

non-participants. The results of this analysis are shown below in Table III for participants and Table IV for non-participants.

Table III

A Comparison of Pre and Post NCE Scores on CTBS Total Battery for Participants in the FAST Program

Year	(N)	NCE Average	Standard Deviation of Scores	Standard Deviation of Difference	t-test	Level of Significance
1984	(20)	56.10	16.7	9.74	5.62	.0000
1985	(20)	68.35	14.7			

Table IV

A Comparison of Pre and Post NCE Scores on CTBS Total Battery for Non-participants in the FAST Program

Year	(N)	NCE Average	Standard Deviation of Scores	Standard Deviation of Difference	t-test	Level of Significance
1984	(23)	40.91	18.26	6.84	1.98	.0600
1985	(23)	43.74	18.49			

Note that in Table III the level of significance is .0000. This means that a difference as great as 12.25 would occur by chance alone less than one in 10,000 times. In Table IV a difference between pre and post test scores of 2.83 is shown. A difference this great would occur six times out of 100 by chance alone. Thus, the data in these two tables show that participants made a very large and significant gain and the non-participants made a small gain that approached but did not reach statistical significance.

Physical Fitness

Seven separate measures were utilized to determine the physical fitness of each of these groups of students in the beginning and the end of this study. These were weight, systolic blood presure, diastolic blood pressure, maximum oxygen consumption, weight, body fat, and resting heart rate.

Maximum oxygen comsumption. The single best indicator of cardiovascular fitness and respiratory efficiency is the maximum oxygen consumption (MVO2). As a child gets older there is a decrease in maximum oxygen consumption. The value measured in this study was compared to the child's body weight. Thus, if body weight increased and cardiovascular fitness was not increased, the result would be lower maximum oxygen consumption at the end of the study than at the beginning.

The measures of MVO2 and body weight are shown below for both groups at the beginning and the end of the study.

	Participant Group		Non-Participant Group	
	Fall 1984	Spring 1985	Fall 1984	Spring 1985
MVO2	53.00	55.30	54.50	48.70
Weight	73.75	79.40	73.10	79.90

These results show that both groups were in the normal range on both these measures for their age at the beginning of the year. It also shows that the participants increased, rather than decreased, their MVO2 by 4.30%, while the control group decreased their MVO2 by 10.60%.

Percent body fat. There is not a direct correlation between weight and percent body fat, as only the latter is also an important indicator of fitness. Body fat was determined for both groups by weighing each individual while he/she was submerged underwater. The before and after results are shown below.

	Participant Group		Non-Participant Group	
	Fall 1984	Spring 1985	Fall 1984	Spring 1985
Weight	73.75	79.40	73.10	79.90
Percent Body Fat	23.40	18.70	22.00	23.40

Both groups increased their weight as one would expect for growing children of this age. There is a rather dramatic difference, however, in the changes in percent body fat. The comparison group increased their weight by 9.30% and their percent body fat by 6.36%, while the participants increased their weight by 7.66% and decreased their percent body fat by 20.08%.

Resting heart rate. This is another measure of cardiovascular fitness and respiratory efficiency. Generally speaking, the slower the pulse rate while at rest the better the physical condition. As a child increases in age the resting heart rate will decrease until adulthood. As the data shown on the next page indicates, both groups experienced a decrease in heart rate, however, the participants showed a decrease of 10.3% as opposed to 6.1% for the control group.

	Participant Group		Non-Participant Group	
	Fall 1984	Spring 1985	Fall 1984	Spring 1985
Resting heart rate	84.9	76.2	88.8	83.4

Blood pressure. The last two measures taken from both groups which related to physical fitness were the systolic and diastolic blood pressure. Both these measures of blood pressure are expected to increase with age and this occurred with both groups as shown below.

	Participant Group		Non-Participant Group	
	Fall 1984	Spring 1985	Fall 1984	Spring 1985
Systolic blood pressure	90.4	97.6	90.2	101.1
Diastolic blood pressure	56.75	56.00	55.00	58.00

These results are consistent with the other measures of fitness reported in this study. The changes in blood pressure are more favorable in terms of physical fitness for the participants of FAST than for students that did not participate in the program. The evidence presented on all the physical fitness measures give support to the hypothesis that participants in the FAST program would increase their cardiovioscular fitness and respiratory efficiency to a greater extent than similar students who did not participate.

Academic Aspirations

Both groups of students were given the Dimensions of Self Concept Scale in the fall of 1984 and the spring of 1985. This scale was developed by Michael and Smith for the Los Angeles Unified School District.* Only one of the five scales (Level of Aspiration) was used in this study. The reliability coefficient for this scale was .82 which is considered highly satisfactory for a scale with 14 items. Examples of items on this scale are:

I try to be one of the best students in my class.

I refuse to give up on difficult schoolwork.

I do the very best I can on my school work.

I want to do well in school so that I can get a good job when I am older.

Students were asked to what extent each statement best describes them. A "1" was assigned to never/almost never, a "2" to sometimes, and a "3" to always/almost always. Thus, the maximum average score would be a 3.0 and the minimum possible would be a 1.0. The scores of the two groups for both the beginning and end of the year are shown below.

Participant Group				Non-Participant Group			
(N)	Fall 1984	(N)	Spring 1985	(N)	Fall 1984	(N)	Spring 1985
(62)	2.53	(51)	2.47	(75)	2.47	(62)	2.30

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* William B. Michael et.al. "Further Developments and Validation of a Self-Concept Measure Involving School Related Activities", Education and Psychological Measurement, 1978, 38.

These results show that both groups scored relatively high on this measure of aspiration. None of the differences shown above are significant, neither the gain scores within each of the groups, nor end of the year scores between groups. It is interesting to note that the attitudes of both groups tended to be less positive at the end of the year.

Since there were non-significant differences between the participants and non-participants, the third hypothesis (higher academic aspiration for participants) was not supported in this study.

Summary of the Results

In this study of the FAST program three hypotheses were advanced. The first hypothesis that participation in an aerobic exercise program with the focus on running, conducted by the classroom teacher, would result in higher academic achievement in reading, language, and math was supported. In fourth grade the test scores of participants were not significantly different before the program and participants' scores were significantly higher after the program. In fifth grade the participants had higher test scores than did non-participants before the program began, yet the participants made very significant gains, while the gains of the non-participants were not significant.

The second hypothesis that participation in the FAST program would result in higher cardiovascular fitness and respiratory efficiency was supported by all the measures of physical fitness utilized, maximum oxygen consumption, percent body fat, weight, resting heart rate, and blood pressure.

The hypothesis that a program of aerobic exercise and running conducted by the classroom teacher would result in more positive feelings of self esteem was not supported . Self esteem was measured as it related to aspiration in school.

Overall, it should be noted that with a different measure of self concept different results might have been obtained regarding self concept. The measure used was directly related to aspiration academically. A broader measure of self concept that included such areas as behavior, physical appearence, anxiety, popularity, and happiness and satisfaction might have yielded different results.